

(11)(1123()

CERTIFICATE OF ANALYSIS

Bechtel Hanford, Inc. 3350 George Washington Way Richland, WA 99352

April 8, 1999

Attention: Joan Kessner

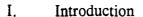
SAF Number : B99-002

Date First Sample Received : February 25, 1999

Number of Samples : One Sample Type : Soil

SDG Number : W02690

Data Deliverable : 15 Day Priority



On February 25, 1999 the Quanterra Environmental Services Richland Laboratory (QESRL) received one-priority soil sample for a 15-day priority radiochemical and chemical analysis. Upon receipt, the sample was assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

QESRL ID#	BHI ID#	<u>MATRIX</u>	DATE OF RECEIPT
9CR4FH10	$\overline{\text{B0TXP2}}$	Soil	2/25/99

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information; analytical results and the appropriate associated statistical errors.

The requested analyses were: Alpha Spectroscopy

Americium-241 by method RICH-RC-5080

Plutonium-238, -239/40 by method RICH-RC-5010 Uranium-234, -235, -238 by method RICH-RC-5030

Gamma Spectroscopy



Bechtel Hanford, Inc. April 8, 1999 Page 2

Gamma Scan by method RICH-RC-5017

Gas Proportional Counting

Total Strontium by method RICH-RC-5006

Liquid Scintillation Counting

Nickel-63 by method RICH-RC-5069

Chemical Analyses

Chromium Hex by EPA method 7196

III. Quality Control

The analytical results for each analysis performed under SDG W02690 includes a minimum of two Laboratory Control Samples (LCS) and one method (reagent) blank. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Alpha Spectroscopy

Americium-241 by method RICH-RC-5080

The LCS, batch blank, sample duplicate (B0TXP2) and sample results are within contractual requirements.

Plutonium-238, -239/40 by method RICH-RC-5062

The LCS, batch blank, sample duplicate (B0TXP2) and sample results are within contractual requirements.

Uranium-234, -235, -238 by method RICH-RC-5030

The LCS, batch blank, sample duplicate (B0TXP2) and sample results are within contractual requirements.

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

The LCS, batch blank, sample duplicate (B0TXP2) and sample results are within contractual requirements.

Gas Proportional Counting

Total Strontium by method RICH-RC-5006



Bechtel Hanford, Inc. April 8, 1999 Page 3

The LCS, batch blank, sample duplicate (B0TXP2) and sample results are within contractual requirements.

Liquid Scintillation Counting

Nickel-63 by method RICH-RC-5069

The Id numbers on the duplicate and matrix spike had inadvertently been switched with only one sample the error was obvious and corrected. The LCS, sample duplicate (B0TXP2), matrix spike (B0TXP2), batch blank and sample results are within contractual requirements.

Chemical Analyses

Chromium Hex by EPA method 7196

The LCS, sample duplicate (B0TXP2), batch blank, matrix spike (B0TXP2) and sample results are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Doug Swenson

Project Manager



SAMPLE RESULTS

LAB NAME:

QUANTERRA, Richland

LAB SAMPLE ID:

9CR4FH10

SDG: /RPT GRP:

W02690 / 7310

MATRIX:

SOIL

CLIENT ID:

B0TXP2

DATE RECEIVED:

2/25/99 9:55:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
 HEXCHROME	0.00E+00	Ú	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	8.64E-02	J	4.0E-02	4.1E-02	2.10E-02	pCi/g	87.90%	RICHRC5080
PU-238	-9.42E-04	U	1.3E-03	1.3E-03	2.69E-02	pCi/g	70.40%	RICHRC5010
PU239/40	9.42E-03	U	1.7E-02	1.7E-02	3.32E-02	pCi/g	70.40%	RICHRC5010
AM-241	-4.91E-02	U	7.2E-02	7.2E-02	1.17E-01	pCi/g	N/A	RICHRC5017
CO-60	9.53E-03	U	1.5E-02	1.5E-02	2.77E-02	pCi/g	N/A	RICHRC5017
CS-137	1.18E-01		2.9E-02	2.9E-02	2.55E-02	pCi/g	N/A	RICHRC5017
EU-152	4.39E-01		7.7E-02	7.7E-02	6.17E-02	pCi/g	N/A	RICHRC5017
EU-154	4.92E-02	U	4.9E-02	4.9E-02	8.67E-02	pCi/g	N/A	RICHRC5017
EU-155	3.86E-02	U	4.0E-02	4.0E-02	6.79E-02	pCi/g	N/A	RICHRC5017
RA-226	6.44E-01		9.3E-02	9.3E-02	4.47E-02	pCi/g	N/A	RICHRC5017
RA-228	8.64E-01		1.5E-01	1.5E-01	8.37E-02	pCi/g	N/A	RICHRC5017
U-238DHP	1.58E+00		9.6E-01	9.6E-01	9.16E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	2.97E-02	U	4.8E-02	4.9E-02	1.21E-01	pCi/g	67.00%	RICHRC5006
NI-63	1.87E+00	U	9.3E-01	2.7E+00	2.17E+00	pCi/g	28.60%	RICHRC5069

Number of Results: 15



SAMPLE RESULTS

LAB NAME:

QUANTERRA, Richland

SDG: /RPT GRP:

W02690 / 7310

LAB SAMPLE ID:

9CR4FH20

MATRIX:

SOIL

CLIENT ID:

B0TXP2

DATE RECEIVED:

2/25/99 9:55:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
U-234	7.99E-01	J	1.3E-01	1.6E-01	3.27E-02	pCi/g	80.10%	RICHRC5030
U-235	2.62E-02	U	2.6E-02	2.6E-02	3.93E-02	pCi/g	80.10%	RICHRC5030
U-238	8.43E-01	J	1.3E-01	1.7E-01	2.82E-02	pCi/g	80.10%	RICHRC5030

Number of Results: 3

Quanterra Data Review Checklist RADIOCHEMISTRY

700250157				
Work Order number 1st: 398250157				
Client ID: BHI				··
Due Date: 3-12-99				
Lab Sample Number or SDG: 90:59 108				
Method Test Parameters: AM ISO				
Macrice Soil		1 31-773	NA(J)	1 2 Lavet
Review liem	Y a (√)	No(√)	IVA(V)	Review (1)
A. Calibration 1. Is the calibration documentation included where applicable?				
8. Sample Analysis			1	
L. Are the sample yields within accessance criteria?	1/			
2. Were all sample holding times mat?				
3. Is the sample Minimum Desecrable Activity < the Contract Detection Limit?	1./			
C. QC Samples 1. Is the blank yield within acceptance criteria				
2. Is the Minimum Detectable Activity for the blank result 5 the Contract Detection Limit?				
3. Is the blank result < 1/2 the Compact Detection Limit?				
4. Is the bianic > 1/2 the Commet Detection Limit but < Commet Detection Limit?			1 /	
5. Is the blank result > the Contract Detection Limit but the sample result < the Commet. Detection Limit?				
6. Is the LCS result within seceptance criteria?				1/
7. Is the LCS yield within acceptance criteria	/	1		
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	/			1. /
9. MS/MSD results and yield most acceptance criteria?			10	
10. Duplicate sample results and yield meet acceptance criteria?				
D. Other 1. Are all Nonconformances included and noted?				
2. Are all required forms filed out?	1			
Correct methodology used?	1			1
4. Transcription chacked? 2m 3-17.99	/			PE
5. Were all calculations checked at a minimum Sequency?	1 ,			
6. Units enecked?	1	Ţ		
Comments on any "No" response:				
				: A.
First Level Review: Kanut Cruth 11		_ Date:	3-17-7	7
- Cl Denil		Date	. 4/1	199
Second Level Review:			·	

Quanterra Data Review Checklist RADIOCHEMISTRY

+	7/2/11	l Date:		Second Level Review: A
2	200	. Date: 13		First Level Review: Tank Control
				Comments on any "No response:
(,	6. Units checked?
,		- 	5	5. Were all calculations checked at a minusum frequency?
え)				4. Transcription checked?
1			C	3. Carrect methodology used?
				2. Are all required forms filed out?
	(Other Nonconformances included and noted?
(7	10. Duplicate sample results and yield most socoptates critera?
	(9. MS/MSD results and yield meet acceptance orners?
/				8. Is the LCS Minumum Detectable Activity ≤ the Comman Detection Limit?
1			5	7. Is the LCS yield within acceptance criteria
,			5	6. Is the LCS result within soccourses criteria?
	(— — 	 Is the black result > the Contract Detection Limit but the sumple result < the Contract Detection Limit?
	,			4. Is the blank > 1/2 the Common Detection Limit but < Common Detection Limit?
\			~	3. Is the clark reput < 1/2 the Comment Detection Limit?
(5	2. Is the Minimum Depotable Activity for the blank result ≤ the Commet Detection Limit?
\				C. QC Samples 1. Is the blank vield within accounts criteria
(3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?
1				2 Were all cample bolding times mat?
\				S. Sample Analysis I. Are the sample vields within acceptance criteria?
	7			A. Calibration L. Is the calibration documentation included where applicable?
Review ()	NA(4)	No (4)	Ya(*)	Review lien
				Marric Soil
				I - 1
				م) Sample Number or SDG: 4059 ا 100 و المسابع Sample Number or SDG:
 - 				Work Order number (s): コートン・ハン・ハン・ハン・ハン・ハン・ハン・ハン・ハン・ハン・ハン・ハン・ハン・ハン

Quanterra Data Review Checklist RADIOCHEMISTRY

Work Order mumber (s): 4900 398250157				
Disc Pare: 3112199				
001 0100			··_	
Method Test Parameters: (('Anii'))				
Matrix: Review (tem	Yes(/)	No(√)	NA(J)	2 Level
STAIGH (TITE	•= (, ,			Review (J)
A. Calibration			<i></i>	
Is the calibration documentation included where applicable?		 		
B. Semple Analysis			,	
Are the sample yields within acceptance criteria?		<u> </u>		
2. Were all sample holding times met?	<i>:-</i>	<u> </u>		
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	<u> </u>	<u> </u>		
C. QC Samples			}	- }
1. Is the blank yield within acceptance criteria		<u> </u>		
 Is the Minimum Deterrable Activity for the blank result ≤ the Courset Deterrior Limit? 	V			<u> </u>
3. Is the blank result < 1/2 the Comment Detection Limit?		<u> </u>	!	
4. Is the blank > 1/2 the Contract Detection Limit but < Commet Detection Limit?	ļ	<u> </u>		
5. Is the blank result > the Contract Determon Limit but the sample result < the Contract Determon Limit?			V	
6. Is the LCS result within acceptance criteria?	1 <u> </u>	<u> </u>		
7. Is the LCS yield within acceptance criteria	1	<u> </u>		_!
8. Is the LCS Minumum Detectable Activity ≤ the Contract Detection Limit?	1	<u> </u>		
9. MS/MSD results and yield most acceptance criteria?	<u> </u>	<u> </u>	I V	
10. Duplicate sample results and yield meet acceptance criteria?	<u></u>	<u> </u>	!	<u> </u>
D. Other		1		
1. Are all Nonconformances included and noted?	<u> </u>			
2. Are all required forms filed out?		 		10:
3. Correct methodology used? 21 XVIII-3	121/99 /		!	1//
4. Transcription checked?		<u> </u>		
5. Were all calculations checked at a minimum frequency?	1 m			
6. Units checked?				
Comments on any "No response: Crrun Now PK 3-	2299			
_				
D . k . 1		Date	3-21-9	9
First Level Review: Pan Konchya!		- Date:		
Second Level Review:		Date	·	
Form #: LS-038,2 /96, Rev.4				

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM) PAGE 1 OF 2

	: RD-99-			 _
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		محمد من
Project ID: SHI	NCM Initiated by: PK	13-899 ··
Sample Numbers: J98250157		<u> </u>
Tests: LLSA		<u> </u>
Matrix: solid		
Analytical Area (check appropriate area):		
☐ Sample control ☐ GC	☐ Wet chemistry	☐ Data review
O Organic preparation O HPLC	☐ Metals	🗷 Radiochemistry
☐ Inorganic preparation ☐ GC/MS	☐ Reporting	☐ Bioassay
Nonconformance (check appropriate area):		
Holding Time Violations (exceeded by days)	Quality Assurance/Quality Cont	trol
Category I: Laboratory Independent	☐ 17. QC data reported outside	of controls
 I. Holding time expired in transit 	☐ 18. Incorrect procedure used	
2. Sample received > 48 hrs. or 1/2 holding time has expired	☐ 19. SOP intentionally modifi	ed with QA and Tech. approval
3. Test added by client after expiration	20. Invalid instrument calibrates	ation
Category II: Laboratory Dependent	21. Insufficient sample recei	ved for proper analysis
4. Instrument failure	Incorrect or Incomplete Client	Deliverable
☐ 5. Analyst error	22. Hardcopy deliverable err	or
☐ 6. Login error	23. Electronic deliverable en	ror
☐ 7. Miscommunication	Reported detection limits elevate	ed due to:
8. Other (complete description required)	☐ 24. Sample matrix	
Category III: Analysis Reruns (QA/QC)	25. Insufficient sample volur	ne
☐ 9. Surrogates	26. Other (complete descript	ion required)
Q 10. Internal Standards	\$ 27. Other (specify): poss	ble contamination
☐ 11. Spike Recoveries		
12. Blank Contamination	Comments/Explanation:	
Category IV: Analysis Reruns (Confirmation)		·
13. Second column	 	
14. Contamination check		
☐ 15. Confirmation of matrix effects		
☐ 16. Other (complete description required)		
Notification (check appropriate area):		
Client notified by (name and date):	Client's name and response:	
in writing () U by facsimile	process "as is"	☐ re-sample
☐ by telephone ☐ other (explain)	on hold unfil	other (explain)
Project Manager (signature and date):	4/6/17	

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM) PAGE 2 OF 2

	LQG#:	RD-99
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Corrective Action	
Root Cause	Initial and date: 6uc 3/9/99
Before column sample centrifug	
outside of cent tube fell into	soite
·	
Corrective Action	Initial and Date: PK 3-22-99
reanalysis was started b	efore data finished going thru
system Kranalysis data	accepted
Responsibility for performing CA assigned to:	
Actions to prevent recurrence	Initial and Date:
· · · · · · · · · · · · · · · · · · ·	
	- 6
First Level Supervisor: Pan Kanthu	Date: 4-8-99
Responsible Manager:	FOR VILP Date: 4/8/79
Quality Assurance Review	
☐ Anomaly	☐ Deficiency ☐ Rerun
Further action required:	
Assigned to:	(1200
QA signature:	Date: TV-M
Corrective Action Verification	
Verified	
☐ Cannot Verify (specify reason):	
Nonconformance Memo Closure	
	hill
QA signature/date:	140,
	V

Quamerra Data Review Checklist RADIOCHEMISTRY

Work Order number (st.				
Lab Sammie Number or SDG: 9(5)				
\forall				
Marix			X	
	Υœ(√)	No (~)	NA(4.)	Review (4)
A Cultbration			7	
1. Is the calibration documentation incinded where applicable?			7	
B. Sample Analysis 1. Are the sample vields within accordance criteria?	ļ		7	.
2. Were all sample holding unse met?			1	_
1. Is the sample Minimum Detectable Activity < the Contract Describes Limit?	7			
C. QC Samples 1. Is the blank vield within secontaines criteria			7	
Is the Minimum Desects	>			>
3. Is the blank result < 1/2 the Coursex Detection Limit?	>			
4. Is the blank > 1/2 the Contract Desertion Limit but < Contract Desertion Limit?		_	7	
 Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit? 			7	
6. Is the LCS result within scorptures criteria?	\			7
7. Is the LCS yield within acceptance criteria			7	
8. Is the LCS Minimum Detectable Activity 5 the Caratat Detection Limit?	/			
9. MS/MSD results and yield meet accordance criteria?			\	
10. Duplicate sample results and yield most schoptanes crimis?	7			<u> </u>
D. Other 1. Are all Nonconformances included and noted?			\	
2. Are all required forms filed out?				
3. Carrect methodology used?	\			
4. Transcription checked?				<u> </u>
5. Were all exiculations checked at a minimum frequency?	//			1
6. Units expected?				
Comments on any "No response:				
				, ,
En mi Brien Millich Waldell	deci	Dage:	3/15/1/6	
		Date	7	(99)
Second Level Renew: From 4: 1 Sept 4		1		
Form F. Library 170, Sev. 4				

Mansfer CS137, Cowo, EU152, EU154, EU155, Ruzie, Rüzie, Amai, U238

Quanterra Data Review Checklist RADIOCHEMISTRY

Work Order number (s): 19 B 25015 7			· · · · · · · · · · · · · · · · · · ·	
Client ID: BHI				
Due Date: 3-12-99				
Lab Sernole Number or SDG: 909110				
Method Test Parameters TOTAL ST				
Matrix SOLL			<u></u>	
Review (ten)	Ya(√)	No (J)	NA(√)	Z Lavei Review ()
A. Calibration				
Is the calibration documentation included where applicable?	<u> </u>	<u> </u>		
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?	<u> </u>	<u> </u>		
2. Were all sample holding times met?	· · · · ·			+ -
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?		<u> </u>		
C. QC Samples 1. Is the blank yield within screptance criteria				
2. Is the Minimum Detectable Activity for the blank result ≤ the Courset Detection Limit?				//
3. Is the blank result < 1/2 the Comract Detection Limit?				
4. In the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?				
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?				<u> </u>
6. Is the LCS result within acceptance criteria?				
7. Is the LCS yield within acceptance criteria		<u> </u>		
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?				<u> </u>
9. MS/MSD results and yield meet acceptance criteria?		<u> </u>		
10. Duplicate sample results and yield meet acceptance criteria?	/			
D. Other				
Are all Nonconformances included and noted?	<u> </u>			+
2. Are all required forms filed out?		!		
Correct methodology used?		<u> </u>		
4. Transcription checked? >M .3 -11-99				1
5. Were all exiculations checked at a minimum frequency?				
6. Units checked?				1
Comments on any "No" response:				
First Level Review: Octobel Conc. Will Second Level Review: Form #: LS-038,2/96, Rev. 4	ldec1	Date:		99

Quanterra Data Review Checklist RADIOCHEMISTRY

				
Work Order number (s): 598250157				
Client ID: BHT				
Due Oster 31219				
Lab Sample Number or SDG: 9059105				
Method Test Parameters: Nickel-13				
Matrix SNI O				
Raview liem	Yes(1)	No(J)	NA(V)	Z*Level Review(*)
A. Cailbretton	`			
1. Is the calibration documentation included where applicable?		<u> </u>		
B. Sample Analysis		1	BV31	122/99
1. Are the sample yields within accounts oriunia?	<u></u>	<u> </u>		
2. Were all sample holding times met?		1		}
3. Is the sample Minimum Detocrable Activity < the Contract Detectors Limit?		1		
C. QC Samples			1 74	130/99
l. Is the blank yield within acceptance criteria	V	<u> </u>		
 Is the Minimum Descripte Activity for the blank result ≤ the Courses Describe. Limit? 				
3. Is the blank result < 1/2 the Comment Detection Limit?	V		1	
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			1	<u> </u>
5. Is the blank result > the Common Detection Limit but the sample result < the Contract Detection Limit?			1	
6. Is the LCS result within acceptance criteria?	/	1		
7. Is the LCS yield within acceptance criteria	/			
8. Is the LCS Minimum Detectable Activity 5 the Commen Detection Limit?		<u> </u>		1.
9. MS/MSD results and yield meet acceptance criteria?	/	<u> </u>		
10. Duplicate sample results and yield meet acceptance orneria?		<u> </u>		
D. Other 1. Are all Nonconformances included and notes? ([-NG1])	/			
2. Are all required forms filed out?	/	1	<u> </u>	
3. Correct methodology used?				
4. Transcription checked? SW 312049		1		
Were all exiculations checked at a minimum frequency?		1	}	
6. Units medical?				1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Comments on any "No' response: 1D SWITCH bit alle [011/4] Sample in ba	p frils - tch)	SER NU	u ciata u	ccepreu
First Level Review: Toky Getti Gene Walder		Date:	3/22/49	ÎN .
Second Level Review: Form #: LS-038,2/96, Rev.		Date	-7/3/-/	·_/

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QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM) PAGE 1 OF 2

Project ID: J9B250157 BHI	NCM Initiated by: NCM Initiated	2/99
Sample Numbers: CR4FH10PS, CR4FH109X		
Tests: <u> </u>		<u> </u>
Matrix: SOLI		<u> </u>
Analytical Area (check appropriate area):		A CONTRACTOR OF THE CONTRACTOR
☐ Sample control ☐ GC	☐ Wet chemistry	Data review
Organic preparation HPLC	☐ Metals	Radiochemistry
☐ Inorganic preparation ☐ GC/MS	☐ Reporting	☐ Bioassay
Nonconformance (check appropriate area):		#
Holding Time Violations (exceeded by days)	Quality Assurance/Quality Contr	ol ,
Category I: Laboratory Independent	☐ 17. QC data reported outside	of controls
1. Holding time expired in transit	☐ 18. Incorrect procedure used	. A second of the second of th
2. Sample received > 48 hrs. or 1/2 holding time has expired	☐ 19. SOP intentionally modifie	d with QA and Tech. approval
3. Test added by client after expiration	20. Invalid instrument calibra	non
Category II: Laboratory Dependent	21. Insufficient sample receiv	ed for proper analysis
4. Instrument failure	Incorrect or Incomplete Client D	eliverable
☐ 5. Analyst error	22. Hardcopy deliverable erro	r
☐ 6. Login error	23. Electronic deliverable erro	or
7. Miscommunication	Reported detection limits elevated	i due to:
☐ 8. Other (complete description required)	☐ 24. Sample matrix	
Category III: Analysis Reruns (QA/QC)	25. Insufficient sample volum	e
9. Surrogates	26. Other (complete description	on required)
☐ 10. Internal Standards	27. Other (specify): 1DS	Witch with
☐ 11. Spike Recoveries		trix spike samples
12. Blank Contamination	Comments/Explanation:	
Category IV: Analysis Reruns (Confirmation)		
☐ 13. Second column		
14. Contamination check		· .
☐ 15. Confirmation of matrix effects		<u>.</u> .
☐ 16. Other (complete description required)		
Notification (check appropriate area):		
Client notified by (name and date):	Client's name and response:	
in writing CN D by facsimile	process "as is"	☐ re-sample
O by telephone O other (explain)	on hold until	other (explain)
Project Manager (signature and date):	4/6/90	1

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QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM) PAGE 2 OF 2

LOG#: RD-99-

Corrective Action		
Root Cause	Initial and date: 103/5	00/49
Tech enor	$\mathcal{G}^{}$	1.500
Corrective Action	Initial and Date: XUB/	20144
Since only one sample w/de	up EMS in batch	- labelling error
13 obvious. Dups agree and ne	S is within lime	its, therefore
IDS were corrected and resu	ets recalculate	ed.
	accepted.	
Exo, .		
Responsibility for performing CA assigned to:		
Actions to prevent recurrence	Initial and Date: 788/	20169
Tech remended to use can	+7071 & Chock SO	minte in a when
1 cent reminate to use cuit	Tiones Charles ou	in pacino
labelling vals.		
First Level Supervisor: OCGULLINE UN	delel	Date: 3/20/99
	20013	11 1/22
Responsible Manager:	tor VItI	Date: 4/8/97
Quality Assurance Review		<u> </u>
Quanty Assurance Review		
☐ Anomaly	Deficiency	□ Rerun
☐ Further action required:		
Assigned to:		<u> </u>
		Date: 4-8-PA
QA signature:		Date. O a c
Corrective Action Verification		
Davis		
Serviced N. I. C.		
Cannot Verify (specify reason):		
Nonconformance Memo Closure		
QA signature/date:	gen 4-8-99	



Richland Laboratory Data Review Check List METALS

Work Order Number(s): QC Batch 9070195 (Reextracte	on c	190	1693	32/)
Lab Sample Numbers or SDG: WC2690				
Method/Test/Parameter: CR+6 in SCIL				
Review Item	Yes (✔)	No (❤)	N/A (✓)	2 nd Level Review (✓)
A. Initial Calibration				
1. Performed at required frequency wih required number of levels?	1.			V
2. Correlation coefficient within QC limits?				
3. Initial calibration verification (ICV) analyzed immediately after calibration and results within QC limits?	<u></u>			/
4. Initial calibration blank(ICB) analyzed immediately after ICV and concentrations of all parameters ≤ reporting limit?				
B. Continuing Calibration				
CCV analyzed at required frequency and all parameters within QC limits?	1		<u> </u>	
 CCB analyzed at required frequency and all results ≤ reporting limit? 				
C. Sample Analysis				
Were any samples with concentrations above the linear range for any parameter diluted and reanalyzed?				
2. Were all sample holding times met?				
D. QC Samples				
All results for the preparation blank below limits?				
2. MS or MS/MSD recoveries within QC limits and %RPD (for MSD) acceptable?				
3. LCS percent recovery within QC limits and %RPD (for LCSD) acceptable?				
4. Analytical spikes within QC limits where applicable?			1	
5. ICP only: One serial dilution performed per SDG?			V	
6. ICP only: CRDL standard (CRI or CRA) analyzed at required frequency?				
7. ICP only: Interference check samples (ICSA, ICSAB) and HICAL analyzed at the required frequencies and within QC limits?				

Review Item	Yes (*)	No (✓)	N/A (✓)	2 nd Level Review (√)
E. Other				
Are all nonconformances included and noted?				
2. Is the correct date and time of analysis shown?	V			7
3. Did the analyst sign and date the front page of the analytical run?				
4. Correct methodology used?				
5. Transcriptions checked?				/
6. Calculations checked at minimum frequency?				
7. Units checked?	V			·

Comments on any "No" response:		
	•	
	<u></u>	
Analyst: Roxie Ross		Date: 3/1/99
Second-Level Review: \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		Date: 4/8/97

Form No. CG-191, Rev. 2, 1/97

CHAIN OF CUSTODY FORMS

N- 27034

Bechtel Hanford Inc. CHAIN OF CUSTOD			TODY/S	Y/SAMPLE ANALYSIS REQUEST				г	B99-002-72		Page <u>l</u> of <u>l</u>			
Collector Fahlberg/Coffman		Company R Coff	y Contact	Telepho 376-6				oject Coordi	nator	Data Price Code			Data Turnaround	
Project Designation			Location	3/0-0	423	***********		ENT, SJ F No.				15	Days	
100 BC Areas - Full Protocol		100B/0	Č					9-002						
ce Chest No. ERC 99	-009	Field Log	gbook No. 27-2				Me	thod of Ship	ment) EH) C	46	HAND	DELIVE	
hipped To Quanterra Incorporated			roperty No.				Bil	of Lading/	Air Bill N	0.	/			
Quantona meorporated		N/	9					<i>N</i>	<u> </u>					
	. <u>.</u>						C	OA R	16B	1126	20			
POSSIBLE SAMPLE HAZAR	DS/REMARKS		Preservation	Coal 4C	None	None	None							
			Type of Container	aG	P	aG	Marinelli							
		T ₁	No. of Container(s)	0	Ì	1	1							
Special Handling and/or Stora	ge		Volume	60mL	20mL	250mL	500mL]		
SDL WXX69D	SAMPLE ANALYSIS			Chromium Hex - 7196	Activity Scan	ICP Metals - 6010A (SW- 846) (Chromium, Lead); Mercury -	See item (1) in Special Instructions							
Sample No.		Sample Date	Sample Time			7471 - (CV)							PASSION	
OOTXP2 CR4FH		: 24.9		×	kan ne game na san al	Х	Y		Los des		d Lait (1)	10 300	NAME OF TAXABLE PARTY.	
					<u> </u>									
CHAIN OF POSSESSION		Sign/Print l	Names	 			RUCTIONS lyses is done in	n Richland, tak	e needed vo	lume from the 5	00 ml.	Matrix	. *	
telinguished By K. FOOO R. FOO Relinguished By K. W. FO SO SO GALE SAN SOL 2 telinguished By telinguished By	25-99 0955 Date/Time	_	Alling D	ate/Time // ate/Time // ate/Time	Marin (1) C Euro 241;	elli; if done in iamma Spectro ium-155); Ga	n St Louis, takt oscopy {Cesiu amina Spec - A nium; Isotopic	m-137, Cobalt dd-on (Ameri	e from the 60, Europiu sium-241, U	250 mL aG ICP im-152, Europiu franium-238}; A i Total Sr; Nic	bottle. m-154, mericium-	Soil Water Vapor Other Solid Other Liqu		
LABORATORY Received By SECTION				Ť	itle	<u>, </u>		· · · · · · · · · · · · · · · ·		· <u> </u>		Date/Time		
FINAL SAMPLE Disposal Met DISPOSITION	hod			<u></u>	···	Disp	osed By				••	Date/Time		

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.

Radiological Counting Facility

THI-RCF

38.02

Project Customer I RCF ID Isotope	D	100BC Loc BOTFT8 RCF5443 Sample time Activity, pCi	e, dal	te	9:08 2/9/99	date	
K40		1.6e+01	+/-	1.7e+00			
Co50		2,00-02	+/-	2.0e-02			
1129	<	6.1e-01					
Cs137		9. 5e- 02	+/-	3,0 e- 02			
Eu152	<	1.5e-01					
Eu154		1.5 c- 01	+/-	7.0e-02			
Eu155	<	1.1e-01					
Th232dau		1.9e+00	+/_	4.5e-01			
U235	<	2.9e-01					
U238		3.1e+00	+/-	2.9e+00			
U238dau		9.0e-01	+/-	1.5e-01			
Np237	<	7,2e-02					
Am241	<	7.5e-02					

Total Activity (pCl/gm) 2.

2.2e+01

Sr-90 N/R
Gross Alpha N/R
Gross Beta N/R
AEA N/R

Definitions:

All errors reported at 2 standard deviations

For solls and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bl214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the solivity of Ac228, Pb212, and Tl208, short fived daughter products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transurances and daughter products.

N/R means no result or analysis not requested

K.A. Robertson-DeMers

Date

ERC Radiological Counting Facility

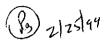
Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 2549 5 SG#: W0269	
Work Order Number: \$48250157 SAF #: 899-00	12 -
Shipping Container ID: The Chain of Custody # 399-	002-72
Custody Seals on shipping container intact?	Yes [J No []
2. Custody Seals dated and signed?	Yes [4 No []
3. Chain-of-Custody record present?	Yes [4 No []
4. Cooler temperature	
5. Vermiculite/packing materials is	Wet [] Dry [9
6. Number of samples in shipping container:	
7. Sample holding times exceeded?	Yes [] No []
8. Samples have:tapehazard labelscustody sealsappropriate sample labels	
9. Samples are:in good conditionleakingbrokenhave air bubbles	
 10. Where any anomalies identified in sample receipt? Yes [] No 11. Description of anomalies (include sample numbers): 	
1611	
Sample Custodian/Laboratory: 1. State: Date:	2-25-99
Telephoned To: On By	

Client Sample Screening Results

25-Feb-99



CLIENT CODE ID	MATRIX RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A NET	CPM A CN	TS B	NET CPM B
BIII BOTXP2 CR4FII	2/25/99 12:23:00 PN SOIL	QUAD21A Bkg:	2/25/99 3:23:03 PM 2/25/99 3:55:09 AM	B0TXP2 BKG	30 600	10 0 2 i	73333333 0.06	98 614	2.24333333 1.023333333
Anl Date: 2/25/99 Ppt mg: 82 2	Tot Sa, Alq: 8.10E+02 Units: mg	, 8.221 → 01 , mg	Alp; (Dpm/ 1.60 Bet; Alq): 4.96	•	••	Ci/ 8.74E+00 g): 2.72E+01	+ 6 3E+00 + 4.1E+00		5.7E±00 Lab 3.7E±00 Alq L[g



COC Signature Page

601969 #: 9059108	Initials/Date	Procedure #
Released By	XX 3149	RICKKLOUG
Received	CZ 3/1/99	PC5013
Released By	C= 3/3/11	n/a
Received	SK 3-4-99	RC 5019
Released By	SK 3-8-99	n/a
Received	1 3-10-59	RicHRE 508U-0
Released By	3-13-59	n/a
Received	CO 3-15-99 CPP+r	3-15-99 PICMICTOOS
Released By	W 3-1549	n/a
Received	1 3/15/91	KICHMODDA
Released By	13/149	n/a
Received	Dm 3-17-99	RICHIS SCO.3
Released By	Zm 3-17-99	n /a
Received	PK 3-17-99	RICHREODOR

RC-131, Rev.0, 8/98

RQC053			Quanterra RAD PREP	a Incor BENCH W	porated ORKSHEET			Run Date: Time:	2/28/99 9:49:17			
Lab Ver	ples Covered ware Labeled ify Test/Container ples Ordered Seque books Entered	ntially	******** * QC BAT(CH: 90	59108 *	Se Se	rep Dt/Tm/Person: epi Dt/Tm/Person: ep2 Dt/Tm/Person: ektail Date/Time:	2/28/99 0/00/00 0/00/00 0/00/00	0 0000 0000			
SX: Americium-241 by Alpha Spec 61: PuAm PrpRC5013/RC5019, SepRC5080(5003)/RC5010(5039) 51: RCH: HANFORD ANALYTICAL												
ANL LOT#, MSRUN#/ DUE WORK ORDER	CLIENT INIT/ MATRIX FINAL	DISH GEOM	PPT1WT	рН	COUNT TIME	MID/AVE DATE/TIME	TRACER ID/ SPIKE ID CRI	OL UN	ITS			
J9B250157-001 3/12/99 CR4FH-1-0DX	SOLID	JCR4FH1R						pC.	i/g			
J9B250157-001 3/12/99 CR4FH-1-07	SOLID							pC:	i/g			
J9B280000-108 0/00/00 CR7AE-1-01 B	SOLID	JCR7AE1B						pC:	i/g			
Ј9В280000-108 0/00/00 СR7АБ-1-02 С	SOLID	JCR7AE1S						pC.	i/g			

NUMBER OF WORK ORDERS IN BATCH:



COC Signature Page

W02690 Batch #: 9059106	Initials/Date	Procedure #
Released By	KA 3-1-99	Richeooog
Received	CZ 3/1/99	RC5013
Released By	CZ 3/3/49	n/a
Received	SK 3-41-99	RC5019
Released By	3/1 3-8-97	п/а
Received	3-10-99	Richer 5010-0 Richer 5080-0
Released By	11- 3-12-99	n/a
Received	Cal 312-99 Edd	3-15-99 RICHNU51039.1
Released By	12 3-15-99	n/a
Received	13/15/95	11014403700
Released By	13/14/95	n/a
Received	5m 3.18.99	BICH'S 5003
Released By	Om 3-18-99	n/a
Received	13K 3-18-99	RICHREOCOS
	Ph 3-18-99	RICHREOCOZ
		RC-131, Rev.0, 8/98

R	Ō	C	0	5	3	

Quanterra Incorporated RAD PREP BENCH WORKSHEET

Run Date: 2/28/99 Time: 9:47:16

Sep1 Prep Sep2 Samples Covered Labware Labeled Verify Test/Container Samples Ordered Sequentially Logbooks Entered

QC BATCH: 9059106

Prep Dt/Tm/Person: 2/28/99
Sep1 Dt/Tm/Person: 0/00/00
Sep2 Dt/Tm/Person: 0/00/00
Cocktail Date/Time: 0/00/00

00000 00000

SO: Plutonium-238,239/40 by Alpha Spec 61: PuAm PrpRC5013/RC5019; SepRC5080(5003)/RC5010(5039) 51: RCH: HANFORD ANALYTICAL

ANL	LOT#,MSRUN#/ WORK ORDER	CLIENT MATRIX	INIT/ FINAL	DISH	GEOM	PPT1WT	рН	COUNT TIME	MID/AVE DATE/TIME	TRACER ID/ SPIKE ID	CRDL	UNITS
3/12/99	J9B250157-001 CR4FH-1-0AX	SOLID		JCR4FH	1 R						1	pCi/g
3/12/99	J9B250157-001 CR4FH-1-06	SOLID									1	pCi/g
0/00/00	J9B280000-106 CR7AC-1-01B	SOLID		JCR7AC	1.B						1	pCi/g
0/00/00	J9B280000-106 CR7AC-1-02C	SOLID		JCR7AC	18						1	pCi/g

NUMBER OF WORK ORDERS IN BATCH:



COC Signature Page

Batch #: 906 8182	BHI Initials/Date	Procedure #
Released By		
Received	SK 3-9-99	RC 5019
Released By	5/1 3-12-99	n/a
Received	Éve 3-12-99	RC 5079
Released By	Fre 3-15-99	n/a
Received	\$ CO3-15-99 EX	116-99 116-99 116-99
Released By	00 3-12-99 RICHAL	163 <i>q</i> / n/a
Received		ficitions.
Released By	+ 3/20/95	n/a
Received	x 3/21/99	RICHISSOCS
Released By	Vn 3/21/99	n/a
Received	PM 3-21-99	RICHROCOS
Released By	PK 3-22 99	n/a
Received		

RC-131. Rev.0, 8/98

RQC053

Quanterra Incorporated RAD PREP BENCH WORKSHEET

Run Date: 3/09/99 Time: 10:43:41

Sepl Samples Covered Labware Labeled Verify Test/Container Samples Ordered Sequentially Logbooks Entered

QC BATCH: 9068182

Prep Dt/Tm/Person: 3/09/99
Sep1 Dt/Tm/Person: 0/00/00
Sep2 Dt/Tm/Person: 0/00/00
Cocktail Date/Time: 0/00/00

000000 000000

SR: Uranium-234,235,238 by Alpha Spec 7S: UIso PrpRC5013/RC5019, SepRC5079(5039) 51: RCH: HANFORD ANALYTICAL

ANL DUE 0/00/00	LOT#, MSRUN#/ WORK ORDER J9C090000-182 CRFED-1-01B	CLIENT MATRIX SOLID	INIT/ FINAL	DISH JCRFED	GEOM 1B	PPT1WT	рН	COUNT TIME	MID/AVE DATE/TIME	TRACER ID/ SPIKE ID	CRDL 1	UNITS pCi/g
0/00/00	J9C090000-182 CRFED-1-02C	SOLID		JCRFED	18						1	pCi/g
3/12/99	J9B250157-001 CR4FH-1-0G X	SOLID		JCR4FH	2R						1	pCi/g
3/12/99	J9B250157-001 CR4FH-2-03	SOLID									1	pCi/g





*** RE-EXTRACTION REQUEST *** CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER BHI	ANALYSIS UGO							
MATRIXSoil	SAMPLE I	DELIVERY GROUP <u>602690</u>						
	OLD BATO	CH NUMBER <u>90 5 9 10 7</u>						
	NEW BAT	CH NUMBER <u>9048182</u>						
LAB SAMPLE ID	CUSTOMER ID	COMMENTS						
1) CRYEH		20						
2) CRUEH ALO								
3)								
4)								
5)								
6)								
7)								
8)								
9)								
11)								
12)								
13)								
14)								
15)								
16)								
17)								
18)								
19)								
20)								
LAB QC ID								
BLANK)								
SPIKE)								

RC-048 1/99 REV 4



COC Signature Page

0P250cm		
Batch #: 9059109	Initials/Date	Procedure #
Released By	AA 31-49	Richaroco
Received	CL 3/1/99	PC5013/5017
Released By	C= 3/3/99	n/a
Received	ON 3/3/99	RICHRDOOD TREVI
Released By		n/a
Received	Nu 3/15/99	RICHIS5226
Released By	En 3/15/99	n/a
Received	DU3/15/99	RICHRCO0000
Released By	JU3/15/99	n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		

RC-131, Rev.0, 8/98

RQC053			Quanterr RAD PREP	a Inc BENCH	orporated WORKSHEET			Run Dat Tim	
I.ah	ples Covered ware Labeled ify Test/Container ples Ordered Sequen books Entered	TA:	* QC BAT * ********** Gamma by Gamma Pro	CH: ***** HPGE RC501	************ 9059109	Pre Sep Sep Cock	p Dt/Tm/Pers 1 Dt/Tm/Pers 2 Dt/Tm/Pers tail Date/Ti	on: 2/28/9 on: 0/00/0 on: 0/00/0 me: 0/00/0	000000 000000
ANL LOT#, MSRUN#/ DUE WORK ORDER J9B250157-001 3/12/99 CR4FH-1-0BX	CLIENT INIT/ MATRIX FINAL SOLID	DISH GEOM JCR4FH1R	PPT1WT		COUNT TIME	MID/AVE DATE/TIME	TRACER ID/ SPIKE ID	CRDL 	UNITS pCi/g
J9B250157-001 3/12/99. CR4FH-1-02	SOLID								pCi/g
J9B280000-109 0/00/00 CR7AF-1-01 B	SOLID	JCR7AF1B							pCi/g
J9B280000-109 0/00/00 CR7AF-1-02 C	SOLID	JCR7AF1S							pCi/g

NUMBER OF WORK ORDERS IN BATCH:



COC Signature Page

OPUGOCU		
Batch #: 9059110	Initials/Date	Procedure #
Released By	XX 31-49	Rickewoo 9
Received	CF 3/1/99	PC5013
Released By	CZ 3/3/99	n/a.
Received	Dac 3-3-89	RC5013-0
Released By	Dac 3-8-99	n/a
Received	RTM 3/8/91	RichRC5006/2
Released By	RTm 3/9/99	ti/a
Received	DA 3/9/99	RICHRISCOBPEUZ
Released By	ul 3/10/49	0/1
Received	5m 3-11-99	RICHIS 5001
Released By	Jm 3-11-99	n/a
Received	W3/12/99	RICHREOCOSP
Released By	Ju3/14/99	n/a
Received		

RC-131, Rev.0, 8/98

RQC053

Quanterra Incorporated RAD PREP BENCH WORKSHEET

Run Date: 2/28/99 Time: 9:51:26

Sep1 Sep2 Samples Covered Labware Labeled Verify Test/Container Samples Ordered Sequentially Logbooks Entered OC BATCH: 9059110

Prep Dt/Tm/Person: 2/28/99 Sepi Dt/Tm/Person: 0/00/00 Sep2 Dt/Tm/Person: 0/00/00 Cocktail Date/Time: 0/00/00

000000

TH: Total Strontium by GPC CH: Sr-Total PrpRC5013, SepRC5006 51: RCH: HANFORD ANALYTICAL

ANL DUE	LOT#,MSRUN#/ WORK ORDER	CLIENT MATRIX	INIT/ FINAL	DISH	GEOM	PPT1WT	рН	COUNT TIME	MID/AVE DATE/TIME	TRACER ID/ SPIKE ID	CRDL	UNITS
3/12/9	J9B250157-001 9 CR4FH-1-0F X	SOLID		JCR4FH	11R						1	pCi/g
3/12/9	J9B250157-001 9 CR4FH-1-04	SOLID									1	pCi/g
0/00/0	J9B280000-110 0 CR7AG-1-01 B	SOLID		JCR7AG	31B						1	pCi/g
0/00/0	J9B280000-110 0 CR7AG-1-02C	SOLID		JCR7AC	318						1	pCi/g

NUMBER OF WORK ORDERS IN BATCH:



COC Signature Page

0PJ60W		
Batch #: 9059105	Initials/Date	Procedure #
Released By	107 3-149	Richacooog
Received	CJ ft 3/1/19	RC5013
Released By	CZ 3/3/99	n/a
Received	SK 3-4-99	RC 5019
Released By	SK 3-8-99	n/a
Received	RB 3/8/99	RichRC5069
Released By	RTM 3/15/99	n/a
Received	_ slislas	K14440001
Released By	Marie Ma Malama	n/a
Received	Jan 3/20/99	
Released By	Sch 3/20/99	E/13
Received	W3/20/99	RICHROCCOSTS
Released By	XN3/32/99	n/a
Received		

RC-131, Rev.0, 8/98

RQC053

Prep

Quanterra Incorporated RAD PREP BENCH WORKSHEET

Run Date: 3/11/99 Time: 16:40:10

Sepl Sep2 Samples Covered Labware Labeled Verify Test/Container Samples Ordered Sequentially Logbooks Entered

QC BATCH: 9059105

Prep Dt/Tm/Person: 2/28/99
Sepl Dt/Tm/Person: 0/00/00
Sep2 Dt/Tm/Person: 0/00/00
Cocktail Date/Time: 0/00/00

000000 000000

S4: Nickel by ICP and Nickel-63 by Liquid Scint AF: Ni-63 PrpRC5013/5019, SepRC5069
51: RCH: HANFORD ANALYTICAL

ANL DUE	LOT#,MSRUN#/ WORK ORDER	CLIENT MATRIX	INIT/ FINAL	DISH	GEOM	PPT1WT	рН	COUNT TIME	MID/AVE DATE/TIME	TRACER ID/ SPIKE ID	CRDL	UNITS
3/12/99	J9B250157-001 CR4FH-1-0PS	9070097 SOLID		JCR4FH	1 W						30	pCi/g
3/12/99	J9B250157-001 CR4FH-1-05	907009 7 SOLID									30	pCi/g
3/12/99	J9B250157-001 CR4FH-1-09X	9070097 SOLID		JCR4FH	1R						30	pCi/g
0/00/00	J9B280000-105 CR7AA-1-01B	SOLID		JCR7AA	1B						30	pCi/g
0/00/00	J9B280000-105 CR7AA-1-02C	SOLID		JCR7AA	18						30	pCi/g
0/00/00	J9B280000-105 CR7AA-1-03B N			JCR7AA	31 N						30	pCi/g



COC Signature Page

Batch #: 9069321 9070195 (Initials/Date	Procedure #
Released By	BRA 310-99	Bickrecous 9
Received	(R) 3/10/99	RICHWESTOS RAJ
Released By	B) 3/11/99	n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		

RC-131, Rev.0, 8/98



Quanterra Incorporated 13715 Rider Trail North Earth City, Missouri 63045

314 298-8566 Telephone 314 298-8757 Fax

CASE NARRATIVE

Bechtel Hanford Incorporated 3350 George Washington Way Richland, Washington 99352

March 27, 1999

Attention: Joan Kessner

Denicat Number 550 104

Project Number : 550.184

SDG : W02690 Number of Samples : One (1)

Sample Matrix : Soil
Data Deliverable : IV/EB

Date SDG Closed : February 25, 1999

II. Introduction

On February 25, 1999, one (1) "soil" sample was received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. St. Louis received 1-120ml bottle, not the 250 ml bottle listed on the COC. Upon receipt, the sample was given the following laboratory ID number to correspond with the specific client ID's:

St. Louis ID BHI ID SAF ID Matrix Date of Receipt 20790-001 BOTXP2 B99-002 SOIL 25-FEB-99

III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: ICP Metals 6010 (SW 846){Chromium, Lead}

Mercury - 7471 - (CV)

Deviation from Request: No Deviation from requested methods.



Bechtel Hanford Incorporated

March 27, 1999

Project Number: 550.184

SDG: W02690

Page 2

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK - Quality Control Blank, Method Blank

QCLCS - Quality Control Laboratory Control Sample, Blank Spike

MS - Matrix Spike

MSD - Matrix Spike Duplicate

V. Comments

General:

Priority results were transmitted via facsimile on March 12, 1999.

Metals:

A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

The Matrix Spike and Matrix Spike duplicate for Mercury had recoveries slightly above the 125% recovery limit. The MS was recovered at 129% and the MSD was at 129%, therefore, all associated data was flagged with a "N". The LCS recovery was within QC limits, indicating that the analysis was in control.

I certify that this Summary Package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Shiela M. Louvier

St. Louis Project Manager

Quanterra February 26, 1999 05:11 pm

Account: 10722 Project: 550.184 Quanterra-Richland QAS No. 550.184 Rev. 3

Master Sample Login: 20790

Project Manager: S. Louvier

Sample Header Template:					
Sample No. Client ID Comments	C-Matrix	Date: Collected	Received Du	ie Shipper	Rad Category Rad Sample No.
# Container Type Data:	Analysis	Class Preservati	ve Anal. Due Date	Hold Date Site	(Container Numbers:% Filled)
20790-001 BOTXP2 SAF B99-002/ICAP = CR,PB.	Soil	24-FEB-99 09:5	0 25-FEB-99 09:55 11	-MAR-99 AIRBORNE	1 Screening not Required
1 AN - Amber Glass-120ML	HG/7471/Q4	S COLD	09-MAR-99	24-MAR-99 R7A	(431283:99)
1	ICAP/6010/Q4	S COLD	09-MAR-99	23-AUG-99 R7A	(431283:99)
1	PM/IT/Q4	s COLD	09-MAR-99	23-AUG-99 R7A	(431283:99)
20790-001MS B0TXP2 SAF B99-002/ICAP = CR.PB.	Soil	24-FRB-99 09:5	0 25-FEB-99 09:55 13	-MAR-99 AIRBORNE	1 Screening not Required
1 AN - Amber Glass-120ML	HG/7471/Q4	s cold	09-MAR-99	24-MAR-99 R7A	(431283:99)
1	ICAP/6010/Q4	S COLD	09-MAR-99	23-AUG-99 R7A	(431283:99)
20790-001MSD BOTXP2 SAF B99-002/ICAP = CR,PB.	Soil	24-FEB-99 09:5	0 25-FEB-99 09:55 11	L-MAR-99 AIRBORNE	1 Screening not Required
1 AN - Amber Glass-120ML	HG/7471/Q4	s cold	09-MAR-99	24-MAR-99 R7A	(431283:99)
1	ICAP/6010/Q4	s COLD	09-MAR-99	23-AUG-99 R7A	(431283:99)
-	, - , x -				·

Chain of Custody Record

ST louis

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5157747.770 QUA 4124 0797 Chain of Custody Number 0293 Project Manager Client Telephone Number (Area Code) Fax Number Address Analysis (Attach list if Zip Code Site Contact Lab Contact City State more space is needed) Carrier/Waybill Number Project Name Special Instructions/ Conditions of Receipt Contract/Purchase Order/Quote No. Containers & Matrix Preservatives Sample I.D. No. and Description Date Time (Containers for each sample may be combined on one line) Sample Disposal Possible Hazard Identification (A lee may be assessed if samples are retained longer than 3 months) ☐ Archive For Skin Irritant Poison B Return To Client Disposal By Lab Flammable Unknown Non-Hazard OC Requirements (Specify) Turn Around Time Required X Other 19du 7 Days 14 Days 21 Days 48 Hours 24 Ho**j**irs Date 2-2599 1. Received By Time 2. Received By Date Date (2) Relinquished By Time Relinquished By 3. Received By Date Timo Date Time Comments

N- 27030

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Bechtel Hanford	Inc.	C	HAIN OF CUST	ODY/S	AMPLE	L'ANAL	YSIS	REQUES	1	B99-002-72		Page <u>l</u> of <u>l</u>	
Collector Fahlberg/Coffman			oany Contact Coffman	Telephor 376-6				Project Coordi TRENT, SJ	nator	Price Code		Data Tur	naround
Project Designation 100 BC Areas - Full Protoco			ling Location BB/C					SAF No. B99-002	<u> </u>			15]	Days
ice Chest No. ERC 99	3-009	Field i	Legbook No. 1327-2					Method of Ship	ment) E/+/C No.	1 =	HAND	DELIV
Shipped To Quanterra Incorporated			e Property No.			100-1-871		Bill of Lading/	Air Bill !	No.	 	,,,,,,	
	· · · · · ·	l	~ /)			1×150	<u>'</u>	COA P	16 B	11260		<u>,, -</u> <u></u> -	
POSSIBLE SAMPLE HAZA	RDS/REMARKS		Preservation	Cool 4C	Nose	None	None						<u> </u>
			Type of Container	aG	Р	aG	Marinel	Hi .					
Special Handling and/or Sto	rage		No. of Container(s) Volume	0 60mL	l 20mL	250mL	1 500m1						
SDG_ WO2690	SAMPLE ANALY			Chromium Hex - 7196	Activity Scan	ICP Metals - 6010A (SW- 846) {Chromium, Lead}, Mercury - 7471 - (CV)	See item (1 Special Instructio						
Sample No.	Matrix *	Sample Date	Sample Time		his trainment		WHAT I						建
BOTXP2 CR4FH	Soil	2.24.	99 0950	X	よ	ĸ	X	The second secon					
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				\$2	73		1.3				ļ		
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CHAIN OF POSSESSION	<u> </u>	-	int Names	41	SPEC If He		lys es i s dor	ie in Richland, tak		volume from the 50 to 250 mL aG ICP to		Matrix Soil	*
Relinguished By S. FOOD R. F. Relinguished By K. W. S. S. S.J. 6-ALE Shi Sale.	Date/line 1672 4/bac Z.2485 2/ Qate/Time	Received By Redgived By	branes.	ate/Time () ate/Time	(1) (Euro	Jamma Spectro pium-155}; Ga	oscopy (Co unina Spec	sium-137, Cobalt - Add-on (Ameri	-60, Europ cium-241,	iwn-152, Europius Uranium-238}; As 90 Total Sr; Nicl	n-154, mericium-	Water Vapor Other Solid Other Liquid	d
SJ6ALE SySale. Relinquished By ALCHOCOL	2-25-99 0955 Date/Time	Receive By	Alferling	2 <u>159</u> ate/Time 226 9	9830								
Relinquished By	Date/Fime	Received By	D	ate/Time		bred o	-R	eficera	itix	-1C			
LABORATORY Received By SECTION	,			Ti	tle	<u> </u>		- 	_ 	, 	1	Date/Time	
FINAL SAMPLE Disposal M DISPOSITION	lethod					Dispo	osed By	• •			1	Date/Time	

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.

Radiological Counting Facility

THI-RCF

B8.02

Project

100BC Location 116-8-1

Customer ID

BOTFT8

RCF ID

RCF5443

Sample time, date

9:08 date

Isotopa		Activity, pC	2/9/99		
K40		1.6e+01	+/-	1.7e+00	
Co60		2.0e-02	+/-	2.0e-02	
1129	<	6.1e-01			
Cs137		9.5e-02	+/-	3.0e-02	
Eu152	<	1.5e-01			
Eu154		1.5e-01	+/-	7.0e-02	
Eu155	<	1.1e-01			
Th232dau		1,9e+00	+/-	4.5e-01	
U235	<	2.9e-01			
U238		3.1e+00	+/-	2.9e+00	
U238dau		9.0~-01	44-	1 50-01	

7.2e-02

7.5e-02

Total Activity (pCi/gm)

2.2e+01

Sr-90 N/R Gross Alpha N/R Gross Beta N/R AEA N/R

Definitions:

Np237

Am241

All errors reported at 2 standard deviations

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32day is the activity of Ac228, Pb212, and TI208, short fived daugnter products of Th232. Equillibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products.

N/R means no result or analysis not requested.

K.A. Robertson-DeMers

ERC Radiological Counting Facility

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Re	eceived: 22599 95 Sc#: W026	,90
Work Order N	Number: <u>398250157</u> SAF#: <u>1899-0</u>	02
Shipping Con	tainer ID: Chain of Custody # <u>1899</u>	002-72
1. Custod	dy Seals on shipping container intact?	Yes [J No []
2. Custo	dy Seals dated and signed?	Yes [9 No []
3. Chain-	-of-Custody record present?	Yes [4 No []
4. Coole	r temperature	
5. Vermi	iculite/packing materials is	Wet [] Dry [9
6. Numb	er of samples in shipping container:	
7. Samp	le holding times exceeded?	Yes [] No []
8. San	nples have: tapehazard labels custody sealsappropriate sample labels	
9. San	mples are: in good conditionleakingbrokenhave air bubbles	
10. Where	e any anomalies identified in sample receipt? Yes [] No	
11. Descr	ription of anomalies (include sample numbers):	
	7/1/	
Sample Custo	odian/Laboratory: A While Date:	2-25-99
Telephoned	To:OnBy	

00001**S**



Login No.:	20	79	0
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Condition Upon Receipt Variance Report St. Louis Laboratory

Client: Rec. Project No: Shipper/No: Ar bein	550,184		ated by	Mal	Time: 0830 15 1 293
Condition/Variance (Chec	k all that apply):				
2. ☐ Sample received	I broken/leaking. I without proper preservative. I temperature not within $4 \cdot C \pm 2 \cdot C$ I temperature:			•	does not match sample ID
				All coolers on airbill no	ot received with shipment.
				Other (explain below):	
	I in improper container.				
4. ☐ Sample received	d without proper paperwork. Exp	elain:			
5. Paperwork rece	ived without sample.				
6. □ No sample ID o	on sample container.				
7. □ Custody tape di	sturbed/broken/missing.				
Temperature Variance Does	noted during sample receipt. Not Affect the Following Analy If Cold IX I;	-	_	Upon Receipt:	6°C 250n/ Hrt
Corrective Action:					
☐ Client's Name:		Informed verbally of	n:	Ву	y:
☐ Client's Name:		Informed in writing	on:	В	y:
☐ Sample(s) process Comments: ☐ Sample(s) on hold				If released, notify:	
Sample Control Supervisor Review:		isles.		ie: te:2-26-99	

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

Project: 550.184

Category: ICP Metals EPA 6010 (TAL)
Method: EPA 6010
Matrix: SOLID

Sample Date : 02/24/99
Receipt Date : 02/25/99
Report Date : 03/11/99

Client ID: BOTXP2

Quanterra ID : 20790-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result Unit	Qual.	Detection Limit	Dilution
Chromium Lead	7440-47-3 7439-92-1	QCBLK194656-1 QCBLK194656-1	03/02/99 03/02/99	03/03/99 03/03/99	12.0 MG/KG 4.5 MG/KG	В	1.1 10.8	1 1

Project: 550.184

Category: ICP Metals EPA 6010 (TAL) Method: EPA 6010 Matrix: SOLID

Sample Date : 02/24/99 Receipt Date : 02/25/99 Report Date : 03/11/99

Client ID: BOTXP2

Quanterra ID : 20790-001MS

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result Unit Qual.	Detection Limit Dilution
Chromium	7440-47-3	QCBLK194656-1	03/02/99	03/03/99	94 %REC	1
Lead	7439-92-1	QCBLK194656-1	03/02/99	03/03/99	92 %REC	1

Project: 550.184

Category: ICP Metals EPA 6010 (TAL)
Method: EPA 6010
Matrix: SOLID

Sample Date : 02/24/99 Receipt Date : 02/25/99 Report Date : 03/11/99

Client ID: BOTXP2

Quanterra ID : 20790-001MSD

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution	
Chromium	7440-47-3	QCBLK194656-1	03/02/99	03/03/99	90	%REC			1	_
Lead	7439-92-1	QCBLK194656-1	03/02/99	03/03/99	93	*REC			1	

Project: 550.184

Category: Mercury Method: SW846 7471 Matrix: SOLID Sample Date : 02/24/99 Receipt Date : 02/25/99 Report Date : 03/11/99

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Unit	Qual.	Detection Limit	Dil.
BOTXP2	20790-001	Mercury	7439-97-6	QCBLK194994-1	03/08/99 03/08/99	0.017 MG/KC	UN	0.036	1
вотхр2	20790-001MS	Mercury	7439-97-6	QCBLK194994~1	03/08/99 03/08/99	129 %REC	N		1
BOTXP2	20790-001MSD	Mercury	7439-97-6	QCBLK194994-1	03/08/99 03/08/99	129 %REC	N		1
NA	QCLCS194994-1	Mercury	7439-97-6	QCBLK194994-1	03/08/99 03/08/99	94 %REC			2
NA	QCBLK194994-1	Mercury	7439-97-6	QCBLK194994-1	03/08/99 03/08/99	0.017 MG/KG	ប	0.033	1

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: QUANTERRA_MO	Contract: 550.184
Lab Code: ITMO Case No.: _	SAS No.: SDG No.: W02690
SOW No.: SW846	
EPA Sample No. BOTXP2 BOTXP2SD BOTXP2S	Lab Sample ID _20790-001 _20790-001SD _20790-001S
Warra TCD internal amount annual and	ns applied ? Yes/No YES
Were ICP interelement correction	
Were ICP background corrections If yes - were raw data gene application of background of	erated before
Comments:	.01100020115 .
conditions of the contract, both other than the conditions detail in this hardcopy data package ar	e is in compliance with the terms and technically and for completeness, for led above. Release of the data contained and in the computer-readable data submitted norized by the Laboratory Manager or the by the following signature.
Signature:	Name:
Date:	Title:

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SW-846

1 EPA SAMPLE NO. INORGANIC ANALYSES DATA SHEET

		INORGANIC .	analyses data s	SHE	E.T	1
						B0TXP2
b Name: QUAN	TERRA MO		Contract: 550	0.1	84	DOTALE
b Code: ITMC	Case N	0.:	SAS No.:		SDO	3 No.: W02690
trix (soil/w	ater): SOIL			Lab	Sampl	e ID: 20790-00
vel (low/med	l): LOW	_	I	Dat	e Rece	eived: 02/25/99
Solids:	92.	$\overline{4}$. ,
	<u>—</u>					
Co	ncentration	Units (ug	/L or mg/kg dry	y w	eight)	: MG/KG
	1	 				-
	CAS No.	Analyte	Concentration		Q	M
		-				
	7440-47-3		12.0			P
	7439-92-1	Lead	4.5	B		- P
	7439-97-6	Mercury	0.02	ן ט ו	N	- C <u>V</u>
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lor After:		Clari	ty After:			Artifacts:
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SW-846